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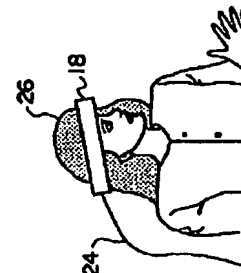
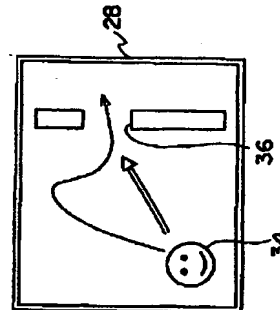
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(54)【発明の名称】 光トポグラフィ装置とデータ生成装置

(57)【要約】

【課題】 念じると共に伴う脳活動の変化を捕らえて操作対象を制御すること。

【解決手段】 操作者の頭部26に固定具18を装着し、頭部26に近赤外線光を照射し、頭部26に照射された光のうち脳の血液を透過した光の反射光を光ファイバ24で集光し、集光した光をその強度に応じた電気信号に光電変換器22で変換し、この電気信号に基づいてコントローラ10によりキャラクタ34の移動を制御する。すなわち、操作者の念じ方が大きいときにはキャラクタ34を孔36の位置まで移動させ、念じ方が小さいときには孔36から外れた位置までキャラクタ34を移動させる。これにより、手や足などを使わずに操作者の脳の活動のみによってキャラクタ34の移動を制御することができる。



## 【特許請求の範囲】

【請求項1】 脳を含む頭部に光を照射する光照射手段と、前記光照射手段から前記頭部に照射された光のうち前記頭部内の血液を透過した光の反射光を集光する集光手段と、前記集光手段により集光された光の強度に基づいて制御対象を制御する制御手段とを備えてなる光ポトグラフィ装置。

【請求項2】 脳を含む頭部に光を照射する光照射手段と、前記光照射手段から前記頭部に照射された光のうち前記頭部内の血液を透過した光の反射光を集光する集光手段と、前記集光手段により集光された光をその強度に応じた電気信号に変換する光電変換手段と、前記光電変換手段の出力による電気信号のレベルに応じた画像を画面上に表示する表示手段とを備えてなる光ポトグラフィ装置。

【請求項3】 脳を含む頭部に光を照射する光照射手段と、前記光照射手段から前記頭部に照射された光のうち前記頭部内の血液を透過した光の反射光を集光する集光手段と、前記集光手段により集光された光をその強度に応じた電気信号に変換する光電変換手段と、前記光電変換手段の出力による電気信号のレベルと設定値とを比較しこの比較結果に応じた操作信号を出力する操作信号出力手段と、前記操作信号に応じた画像を画面上に表示する表示手段とを備えてなる光ポトグラフィ装置。

【請求項4】 脳を含む頭部に光を照射する光照射手段と、前記光照射手段から前記頭部に照射された光のうち前記頭部内の血液を透過した光の反射光を集光する集光手段と、前記集光手段により集光された光をその強度に応じた電気信号に変換する光電変換手段と、前記光電変換手段の出力による電気信号のレベルと設定値とを比較しこの比較結果に応じた操作信号を出力する操作信号出力手段と、画面上に操作対象を含む画像を表示する表示手段と、前記操作信号にตอบสนองして前記画面上の操作対象の移動を制御する画像制御手段とを備えてなる光ポトグラフィ装置。

【請求項5】 脳を含む頭部に光を照射する光照射手段と、前記光照射手段から前記頭部に照射された光のうち前記頭部内の血液を透過した光の反射光を集光する集光手段と、前記集光手段により集光された光をその強度に応じた電気信号に変換する光電変換手段と、前記光電変換手段の出力による電気信号のレベルと設定値とを比較しこの比較結果に応じた操作信号を出力する操作信号出力手段と、画面上にキャラクタを含む画像を表示する表示手段と、前記操作信号にตอบสนองして前記画面上のキャラクタの移動を制御する画像制御手段とを備えてなる光ポトグラフィ装置。

【請求項6】 請求項1、2、3、4または5のうちいずれか1項に記載の光ポトグラフィ装置において、前記光は近赤外線光であることを特徴とする光ポトグラフィ装置。

【請求項7】 脳を含む頭部に光を照射する光照射手段と、前記頭部に照射された光のうち前記頭部内の血液を透過した光の反射光を集光する集光手段と、前記集光手段により集光された光をその強度に応じた電気信号に変換する光電変換手段と、前記光電変換手段によって得られた電気信号を基に前記血液の変化を示すデータを時間軸に関連づけて生成するデータ生成手段とを備えてなるデータ生成装置。

【請求項8】 請求項7に記載のデータ生成装置において、前記血液の変化は、血液の量または血液中のヘモグロビン濃度の変化であることを特徴とするデータ生成装置。

【請求項9】 請求項7または8に記載のデータ生成装置において、生成すべきデータに対する複数のパラメータに関連づけて前記脳に刺激を与える刺激手段を備えてなることを特徴とするデータ生成装置。

【請求項10】 請求項7、8または9のうちいずれか1項に記載のデータ生成装置において、前記光は近赤外線光であることを特徴とするデータ生成装置。

【請求項11】 請求項7、8、9または10のうちいずれか1項に記載のデータ生成装置により生成されたデータを格納してなるデータベース。

【請求項12】 請求項7、8、9または10のうちいずれか1項に記載のデータ生成装置により生成されたデータを格納してなるデータベースをネットワークを介して利用するに際して、予め設定された登録番号を含むアクセスに対してのみ前記データベースを開放することを特徴とするデータベースの利用方法。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、光ポトグラフィ装置とデータ生成装置に係り、特に、光や近赤外線光を用いて脳機能の活動を反映した信号を検出し、この検出信号を利用して制御対象や操作対象などを制御するに好適な光ポトグラフィ装置とデータ生成装置に関する。

## 【0002】

【従来の技術】従来、ゲーム装置やコンピュータなどを操作するに際しては、ジョイスティックやハンドル、キーボードなどが用いられており、これらの操作手段は操作者の操作にตอบสนองして信号を発生するようになっている。

【0003】一方、操作者の操作を要することなく、脳波を利用してゲーム装置を操作するものとして、例えば、特開平6-296757号公報、特開平7-124331号公報に記載されているものがある。脳波を利用した場合、操作者の操作が不要となるが、脳波を利用する場合、脳波を電気信号に変換しなければならず、しかも、この電気信号は微弱な電気信号として検出されるため、筋肉を動かしたときに生じる電気ノイズや外来ノイズの影響を受けやすい。

【0004】この欠点を補うものとして、例えば、特開平9-149894号公報に記載されているように、脳の活動を光学的な手法で測定し、この測定値を各種装置への入力に利用するものが提案されている。

【0005】しかし、脳機能信号をデータ入力や制御信号に用いる場合、入力データや制御信号そのものが操作者の意図した内容になっているか否かを直ちに確認することが困難である。特に、脳波は色々な電気信号が重複しているため、計測した信号から不必要な信号を除去するなどの信号処理を行わなければならない。そのため、操作者の現在の脳機能信号がどのようになっているかを直ちに確認することが難しく、また誤ったデータを入力したときにすぐに修正することが困難である。

【0006】そこで、近赤外線光を用いて、操作者の手の操作に伴う脳機能信号を検出し、検出した脳機能信号にしたがって機器を制御するようにしたものが提案されている（特開2000-172407号公報）。

【0007】

【発明が解決しようとする課題】従来技術においては、近赤外線光を用いて、操作者の手の操作に伴う脳機能信号を検出し、検出した脳機能信号にしたがって機器を制御しているため、手の操作状態に応じて機器を制御することができる。

【0008】しかし、機器を制御するにも、操作者が手を操作しなければならず、脳活動そのものを検出して、すなわち手や足などを操作することなく、脳の活動の変化を検出して機器などを制御することについては配慮されていない。

【0009】本発明の第1の課題は、念じるとこに伴う脳活動の変化を捕らえて制御対象または操作対象を制御することができる光トポグラフィ装置を提供することにある。

【0010】本発明の第2の課題は、念じることに伴う脳部活動の変化の状態を表示することができる光トポグラフィ装置を提供することにある。

【0011】本発明の第3の課題は、念じることに伴う脳活動の変化に関するデータを生成することができるデータ生成装置およびデータ生成装置によって生成されたデータを格納したデータベースを提供することにある。

【0012】本発明の第4の課題は、念じることに伴う脳活動の変化に関するデータが格納されたデータベースの利用方法を提供することにある。

【0013】

【課題を解決するための手段】前記第1の課題を解決するために、脳を含む頭部に光を照射する光照射手段と、前記光照射手段から前記頭部に照射された光のうち前記頭部内の血液を透過した光の反射光を集光する集光手段と、前記集光手段により集光された光の強度に基づいて制御対象を制御する制御手段とを備えてなる光トポグラフィ装置を構成したものである。

【0014】また、前記第2の課題を解決するために、本発明は、脳を含む頭部に光を照射する光照射手段と、前記光照射手段から前記頭部に照射された光のうち前記頭部内の血液を透過した光の反射光を集光する集光手段と、前記集光手段により集光された光をその強度に応じた電気信号に変換する光電変換手段と、前記光電変換手段の出力による電気信号のレベルに応じた画像を画面上に表示する表示手段とを備えてなる光トポグラフィ装置を構成したものである。

10 【0015】前記光トポグラフィ装置を構成するに際しては、前記表示手段の代わりに、以下の要素を付加することができる。

【0016】（1）前記光電変換手段の出力による電気信号のレベルと設定値とを比較してこの比較結果に応じた操作信号を出力する操作信号出力手段と、前記操作信号に応じた画像を画面上に表示する表示手段とを備えてなる。

20 【0017】（2）前記光電変換手段の出力による電気信号のレベルと設定値とを比較してこの比較結果に応じた操作信号を出力する操作信号出力手段と、画面上に操作対象を含む画像を表示する表示手段と、前記操作信号に応答して前記画面上の操作対象の移動を制御する画像制御手段とを備えてなる。

【0018】（3）前記光電変換手段の出力による電気信号のレベルと設定値とを比較してこの比較結果に応じた操作信号を出力する操作信号出力手段と、画面上にキャラクタを含む画像を表示する表示手段と、前記操作信号に応答して前記画面上のキャラクタの移動を制御する画像制御手段とを備えてなる。

30 【0019】前記各光トポグラフィ装置を構成するに際しては、光として近赤外線光を用いることができる。

【0020】第3の課題を解決するために、本発明は、脳を含む頭部に光を照射する光照射手段と、前記頭部に照射された光のうち前記頭部内の血液を透過した光の反射光を集光する集光手段と、前記集光手段により集光された光をその強度に応じた電気信号に変換する光電変換手段と、前記光電変換手段によって得られた電気信号を基に前記血液の変化を示すデータを時間軸に関連づけて生成するデータ生成手段とを備えてなるデータ生成装置を構成したものである。

40 【0021】前記データ生成手段を構成するに際しては、以下の要素を付加することができる。

【0022】（1）前記血液の変化は、血液の量または血液中のヘモグロビン濃度の変化である。

【0023】（2）生成すべきデータに対する複数のパラメータに関連づけて前記脳に刺激を与える刺激手段を備えてなる。

【0024】（3）前記光は近赤外線光である。

50 【0025】また、前記いずれかのデータ生成装置により生成されたデータを格納してなるデータベースを構成

することができる。

【0026】第4の課題を解決するために、本発明は、前記いずれかのデータ生成装置により生成されたデータを格納してなるデータベースをネットワークを介して利用するに際して、予め設定された登録番号を含むアクセスに対してのみ前記データベースを開放することを特徴とするデータベースの利用方法を採用したものである。

【0027】前記した手段によれば、脳を含む頭部に光が照射され、頭部内の血液を透過した光の反射光が集光され、集光された光の強度が検出されると、この光の強度は、体験者（操作者）が念じることによって体験者の頭部内の血液の量あるいはヘモグロビン濃度が変化し、この変化が光の透過率の変化として表れ、この光の透過率の変化が光の強度に反映されるので、光の強度に基づいて制御対象を制御することができる。すなわち、体験者（操作者）が手や足を使わずに念じること、念じの度合いに応じて制御対象を制御することができる。

【0028】また、光の強度を電気信号に変換し、この電気信号に基づいた画像を表示した場合、体験者（操作者）の念じ方に応じた画像を表示したり、念じ方によって操作対象やギャラクタの移動を制御することができる。

【0029】また、光の強度に応じた電気信号のレベルと設定値を比較し、この比較結果に応じた操作信号による画像を画面上に表示する場合、この画面上の画像を見ることが、体験者の理解度や診断などに利用することができる。

【0030】

【発明の実施の形態】以下、本発明の一実施形態を図面に基いて説明する。図1は本発明の一実施形態であって、データ生成装置を含む光トポグラフィ装置のブロック構成図である。図1において、光トポグラフィ装置は、例えば、パーソナルコンピュータで構成されたコントローラ10を備えており、コントローラ10はスイッチ（制御ライン）12、光源14、光ファイバ16を介して固定具18に接続されているとともに、A/D（アナログ・デジタル）コンバータ20、光電変換器22、光ファイバ24を介して固定具18に接続されている。スイッチ12は、コントローラ10からの指令にしたがって回路を開閉するようになっており、回路が閉じたときには光源14に電力が供給される。この光源14は、例えば、発振波長が近赤外線領域にある半導体レーザで構成されており、光源14から発生する近赤外線光が光ファイバ16を介して固定具18に伝送されるようになっている。

【0031】固定具18は帯状に構成され、体験者の頭部26に装着されるようになっている。そして光ファイバ16の端部が固定具18の一端に接続され、固定具18の他端に光ファイバ24の端部が接続されている。固定具18が頭部26に装着された状態で、光源14からの近赤外線光が光ファイバ16を介して頭部26に照射

されると、頭部26に照射された近赤外線光は頭部26の頭蓋骨を透過した後脳内の血液を透過し、血液を透過した光の一部は散乱し、その一部は反射光として光ファイバ24に集光されるようになっている。すなわち、光源14、光ファイバ16は光照射手段として構成されており、光ファイバ24は集光手段として構成されている。

【0032】光ファイバ24によって集光された光は光電変換器22に導かれ、光電変換器22により、その強度に応じてレベル（振幅）が変化するアナログ量の電気信号に変換される。この光電変換器22は、例えば、アバランシェフォトダイオードで構成されており、光電変換手段としての光電変換器22によって得られた電気信号はA/Dコンバータ20に出力されるようになっている。A/Dコンバータ20は光電変換器22からの電気信号であるアナログ信号をデジタル信号に変換し、このデジタル信号を順次コントローラ10に伝送するようになっている。

【0033】コントローラ10は、光ファイバ24によって集光された光がその強度に応じた電気信号に変換されてデジタル信号として入力されたときに、電気信号のレベルに応じた画像を表示するための画像信号を生成し、この画像信号を表示手段としてのディスプレイ28に出力し、ディスプレイ28の画面上に画像信号に応じた画像を表示させるようになっている。

【0034】また、コントローラ10は、制御手段としての機能を備え、電気信号に応じた制御信号を生成し、この制御信号にしたがって機器30の駆動を制御するようになっている。

【0035】さらに、コントローラ10は、操作信号出力手段としての機能を備え、入力された電気信号のレベルと設定値とを比較し、この比較結果に応じた操作信号を出力するとともに、画像制御手段としての機能を備え、操作信号に応答して操作信号にしたがった画像信号を生成し、ディスプレイ28の画面上に表示された操作対象あるいはキャラクターの移動を制御するようになっている。

【0036】また、コントローラ10は、データ生成手段としての機能を備え、入力された電気信号（デジタル信号）を基に、血液の変化を示すデータを時間軸に関連付けて生成し、生成したデータをデータベース32に格納するようになっている。

【0037】データを生成するに際しては、体験者の脳の活動の変化を捕らえてデータを収集することとしている。すなわち、体験者に近赤外線光を照射しているときに、体験者が念じると、体験者の脳に含まれる血液に変化が生じる。

【0038】具体的には、体験者の念じ方に応じて脳中の血液の量または血液中のヘモグロビン濃度（還元、酸化ヘモグロビンの濃度）が変化する。血液の量または血

液中のヘモグロビン濃度が変化すると、体験者の頭部26に照射された近赤外線光の透過率が変化し、この変化は光ファイバ24によって集光される光の強度に反映される。このため、集光された光の強度に応じた電気信号にしたがったデータを蓄積することで、体験者の念じ方の度合いを示すデータを収集することができる。

【0039】データを収集するに際しては、体験者の頭部26に近赤外線光を照射しているときに、生成すべきデータに対する複数のパラメータに関連づけて体験者の脳に刺激を与えるための質問事項、例えば、体験者の体調等に関する質問事項をコントローラ10に接続されたスピーカ（刺激手段）から音声で出力することで、各種パラメータに対する念じ方の度合いを示す個人情報を収集することができる。

【0040】この個人情報として得られたデータをデータベース32に格納することで、データベース32に格納されたデータを、リハビリ教育ツールとして、小児麻痺などの自主リハビリトレーニング教育に利用したり、自動車の緊急回避ツールとして、痙攣発生時の対応に利用したりすることもできる。

【0041】次に、光トポグラフィ装置をゲームに利用したときの作用を図2および図3にしたがって説明する。まず、コントローラ10にゲームに関するプログラム（ゲームソフト）や画像情報が入力されると、この画像情報にしたがった画像がディスプレイ28の画面上に表示される。このとき操作者（ゲーム利用者）の頭部26に固定具18が装着されると、光源14からの近赤外線光が頭部26に照射される。

【0042】操作者の操作によりゲームが開始されると、ゲームソフトの進行に伴ってディスプレイ28の画面上にはキャラクタ34が表示される（ステップS1）。この後、ディスプレイ28の画面上にはキャラクタ34の移動方向が矢印で示される（ステップS2）。このとき、操作者がキャラクタ34を、目標となる孔36を通過させるように念じると、念じ方に応じた光の強度が光ファイバ24を介して光電変換器22で検出される（ステップS3）。光電変換器22で検出された光が電気信号に変換されると、この電気信号はA/Dコンバータ20を介してデジタル信号に変換されてコントローラ10に出力される。コントローラ10は、入力されたデジタル信号の値を数値化し（ステップS4）、数値化されたデータを体験者に対応づけて補正するための演算を行う（ステップS5）。

【0043】この後、コントローラ10は、補正された値にしたがった操作信号を生成し、操作信号にしたがってキャラクタ34を移動させる（ステップS6）。このとき、操作者の念じ方の度合いに応じて生成された電気信号に基づいてキャラクタ34が移動し、入力された電気信号のレベルが設定値を超えたときにはキャラクタ34は目標となる孔36を通過することになる。

【0044】一方、入力された電気信号のレベルが設定値以下のとき、あるいは設定値の範囲から外れたときにはキャラクタ34は孔36を通過することなく、念じ方の度合いに応じた位置に移動する。

【0045】そして、キャラクタ34が孔36を通過したときにはステップS2に戻り、キャラクタ34が孔36を通過しないと判定されたときには（ステップS7）、ステップS4で検出された検出値とキャラクタ34の移動結果が比較される（ステップS8）。この後、比較結果に応じて、ステップS5で用いた補正值を変化させるための演算を行い（ステップS9）、この演算結果から新たな補正值を求め（ステップS10）、ステップS2に戻る。

【0046】この後の処理は、ステップS2～ステップS10までの処理が繰り返され、ステップS8～S10に移るごとに補正值が順次更新されるが、補正值の更新を1回行うだけで、キャラクタ34が目標の位置に到達しないときには、補正值を更新せず、キャラクタ34の移動結果を表示するだけで同じゲームを繰り返したり、他のゲームに移行させることもできる。

【0047】このように、本実施形態によれば、操作者の念じ方によってキャラクタ34を移動させることができ、手や足を用いることなく、操作者の脳の活動そのものを利用してキャラクタ34を移動させることができる。

【0048】また、ゲームを行うに際しては、ゲームが始まる前に、操作者個人のデータベースを相性診断のデータとして利用するために、操作者個人の念じ方の度合いを示すデータを収集し、収集されたデータをゲームに組み込むこともできる。この場合、操作者個人のスキルおよび傾向に合わせたゲームを行うことが可能になる。

【0049】例えば、個人のスキルに合わせて、ゲームの内容、安易性、難易度などゲームのシーン（場面）を変えることができる。

【0050】また、操作者の念じ方の度合いを画像表示する場合、この念じ方に応じてキャラクタ34の色を、例えば、赤、緑、青で変化させることもできる。

【0051】前記実施形態においては、光トポグラフィ装置をゲームに利用したものについて述べたが、この装置は教育などに利用することができる。例えば、各生徒に固定具18を装着させ、先生の言ったことを理解しているか否かを各生徒の念じ方の度合いで判定することができる。

【0052】個人情報として収集されたデータベース32を利用するに際しては、例えば、データベース32をネットワーク（インターネット）に接続し、ネットワークに接続されたものに、データベース32内のデータを利用させる場合、予め設定された登録番号を含むアクセスに対してのみデータベース32を開放する方法を採用することができる。この場合、登録番号を暗号で構成す

ることもできる。

【0053】

【発明の効果】以上説明したように、本発明によれば、体験者（操作者）が手や足を使わずに念じることで、念じの度合いに応じて制御対象を制御することができる。

【0054】また、本発明によれば、体験者（操作者）の念じ方に応じた画像を表示したり、念じ方によって操作対象やギャラクタの移動を制御することができる。

【図面の簡単な説明】

【図1】本発明の一実施形態を示す光トポグラフィ装置 10 のブロック構成図である。

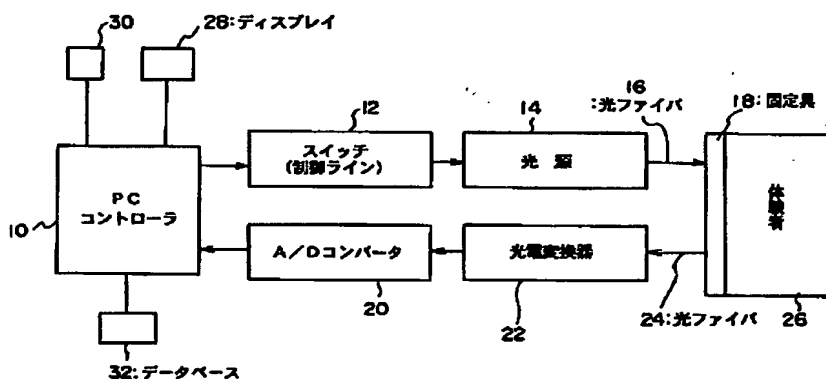
【図2】光トポグラフィ装置をゲームに用いたときの操作方法を説明するための図である。

【図3】光トポグラフィ装置をゲームに用いたときの作用を説明するためのフローチャートである。

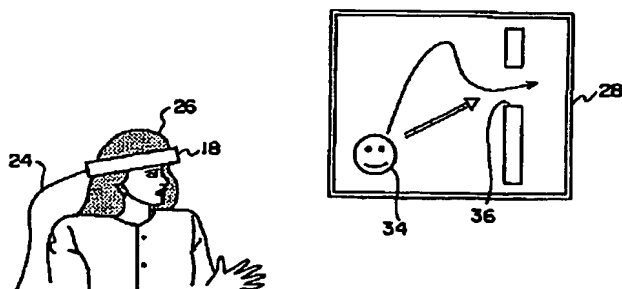
\*【符号の説明】

- 10 コントローラ
- 12 スイッチ
- 14 光源
- 16 光ファイバ
- 18 固定具
- 20 A/Dコンバータ
- 22 光電変換器
- 24 光ファイバ
- 26 頭部
- 28 ディスプレイ
- 30 機器
- 32 データベース
- 34 キャラクタ
- \* 36 孔

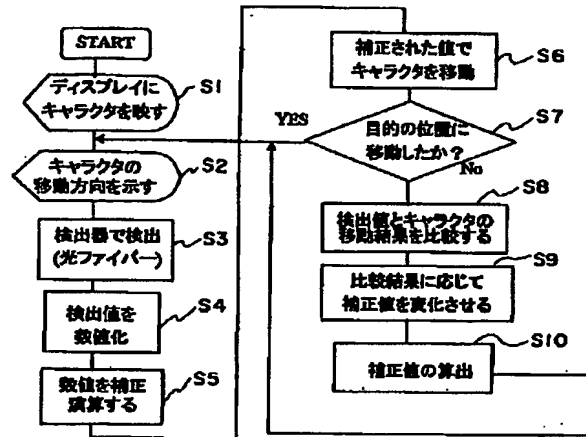
【図1】



【図2】



【図3】



フロントページの続き

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PP04  
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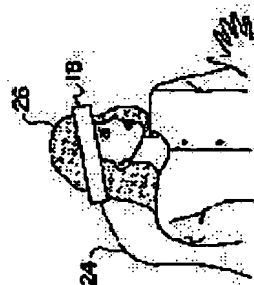
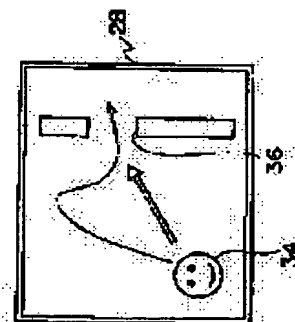
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## (54) OPTICAL TOPOGRAPHIC APPARATUS AND DATA GENERATION DEVICE

(57)Abstract:

**PROBLEM TO BE SOLVED:** To control an object to be operated by catching a change in the activity of the brain due to invoking.

**SOLUTION:** A fixture 18 is mounted on the head part 26 of an operator. The head part 26 is irradiated with near-infrared light. The reflected light of light transmitted through blood in the brain from among the light shone at the head part 26, is condensed by an optical fiber 24. The condensed light is converted by a photoelectric converter 22 into an electrical signal according to its intensity. On the basis of the electrical signal, the movement of a character 34 is controlled by a controller 10. That is to say, when the invoking intensity of the operator is large, the character 34 is moved up to the position of a hole 36, and when the invoking intensity is small, the character 34 is moved up to a position deviated from the hole 36. Thereby, without using hand or foot, the movement of the character 34 can be controlled merely by the activity of the brain of the operator.



## LEGAL STATUS

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## **CLAIMS**

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[Claim(s)]

[Claim 1] Optical POTOGURAFI equipment which comes to have a condensing means to condense the reflected light of the light which penetrated the blood in said head among the light irradiated by said head from the Mitsuteru gunner stage which irradiates light on a head including a brain, and said Mitsuteru gunner stage, and the control means which controls a controlled system based on the luminous intensity condensed by said condensing means.

[Claim 2] A condensing means to condense the reflected light of the light which penetrated the blood in said head among the light irradiated by said head from the Mitsuteru gunner stage which irradiates light on a head including a brain, and said Mitsuteru gunner stage, Optical POTOGURAFI equipment which comes to have a photo-electric-conversion means to change into the electrical signal according to the reinforcement the light condensed by said condensing means, and a display means to display the image according to the level of the electrical signal by the output of said photo-electric-conversion means on a screen.

[Claim 3] A condensing means to condense the reflected light of the light which penetrated the blood in said head among the light irradiated by said head from the Mitsuteru gunner stage which irradiates light on a head including a brain, and said Mitsuteru gunner stage, A photo-electric-conversion means to change into the electrical signal according to the reinforcement the light condensed by said condensing means, Optical POTOGURAFI equipment which comes to have an actuation signal output means to compare the level and the set point of an electrical signal by the output of said photo-electric-conversion means, and to output the actuation signal according to this comparison result, and a display means to display the image according to said actuation signal on a screen.

[Claim 4] A condensing means to condense the reflected light of the light which penetrated the blood in said head among the light irradiated by said head from the Mitsuteru gunner stage which irradiates light on a head including a brain, and said Mitsuteru gunner stage, A photo-electric-conversion means to change into the electrical signal according to the reinforcement the light condensed by said condensing means, An actuation signal output means to compare the level and the set point of an electrical signal by the output of said photo-electric-conversion means, and to output the actuation signal according to this comparison result, Optical POTOGURAFI equipment which comes to have a display means to display the image containing the candidate for actuation on a screen, and the image control means which answers said actuation signal and controls migration for [ on said screen ] actuation.

[Claim 5] A condensing means to condense the reflected light of the light which penetrated the blood in said head among the light irradiated by said head from the Mitsuteru gunner stage which irradiates light on a head including a brain, and said Mitsuteru gunner stage, A photo-electric-conversion means to change into the electrical signal according to the reinforcement the light condensed by said condensing means, An actuation signal output means to compare the level and the set point of an electrical signal by the output of said photo-electric-conversion means, and to output the actuation signal according to this comparison result, Optical POTOGURAFI equipment which comes to have a display means to display the image containing a character on a screen, and the image control means which answers said actuation signal and controls

migration of the character on said screen.

[Claim 6] It is optical POTOGRAPHI equipment characterized by said light being near infrared ray light in optical POTOGRAPHI equipment given in any 1 term among claims 1, 2, 3, 4, or 5.

[Claim 7] A condensing means to condense the reflected light of the light which penetrated the blood in said head among the Mitsuteru gunner stage which irradiates light on a head including a brain, and the light irradiated by said head, Data generation equipment which comes to have a data generation means to relate with a time-axis the data in which change of said blood is shown based on the electrical signal acquired by photo-electric-conversion means to change into the electrical signal according to the reinforcement the light condensed by said condensing means, and said photo-electric-conversion means, and to generate them.

[Claim 8] It is data generation equipment characterized by change of said blood being change of the amount of blood, or the hemoglobin concentration in blood in data generation equipment according to claim 7.

[Claim 9] Data generation equipment characterized by coming to have a stimulus means to relate with two or more parameters which receive the data which should be generated in data generation equipment according to claim 7 or 8, and to give a stimulus to said brain.

[Claim 10] It is data generation equipment characterized by said light being near infrared ray light in data generation equipment given in any 1 term among claims 7, 8, or 9.

[Claim 11] The database which comes to store the data generated by any 1 term with the data generation equipment of a publication among claims 7, 8, 9, or 10.

[Claim 12] The usage of the database characterized by opening said database only to access containing the registration number which faced using the database which comes to store the data generated by the data generation equipment of a publication through a network, and was beforehand set as any 1 term among claims 7, 8, 9, or 10.

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## **DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to optical topography equipment and data generation equipment, detects the signal which reflected the activity of a cerebral function especially using light or near infrared ray light, and relates to suitable optical topography equipment to control a controlled system, the candidate for actuation, etc. using this detecting signal, and data generation equipment.

[0002]

[Description of the Prior Art] It faces operating game equipment, a computer, etc. conventionally, and the joy stick, a handle, a keyboard, etc. are used, and these actuation means answer actuation of an operator and generate a signal.

[0003] On the other hand, there is a thing indicated by JP,6-296757,A and JP,7-124331,A to operate game equipment using an electroencephalogram, without requiring actuation of an operator. When an electroencephalogram is used, actuation of an operator becomes unnecessary, but when using an electroencephalogram, an electroencephalogram must be changed into an electrical signal, and since this electrical signal is detected as a feeble electrical signal, moreover, it tends to be influenced of the electric noise produced when muscles are moved, or an outpatient department nozzle.

[0004] As that with which this fault is compensated, a cerebral activity is measured by optical technique and what uses this measured value for the input to various equipments is proposed as indicated by JP,9-149894,A.

[0005] However, when using a cerebral function signal for a data input or a control signal, it is difficult to check immediately whether the input data and the control signal itself are the contents which the operator meant. Since various electrical signals overlap, especially an electroencephalogram must perform signal processing of removing an unnecessary signal from the measured signal. Therefore, it is difficult to check immediately what an operator's current cerebral function signal has become, and when mistaken data are inputted, it is difficult [ it ] to correct immediately.

[0006] Then, using near infrared ray light, the cerebral function signal accompanying actuation of an operator's hand is detected, and what controlled the device according to the detected cerebral function signal is proposed (JP,2000-172407,A).

[0007]

[Problem(s) to be Solved by the Invention] In the conventional technique, the cerebral function signal accompanying actuation of an operator's hand is detected using near infrared ray light, and since the device is controlled according to the detected cerebral function signal, according to the actuation condition of a hand, a device is controllable.

[0008] However, controlling a device is not considered about detecting change of a cerebral activity and controlling a device etc., either, without an operator's having to operate a hand, and detecting the brain activity itself, namely, operating a hand, a guide peg, etc.

[0009] When the 1st technical problem of this invention is prayed, it is to offer the optical topography equipment which can catch change of the brain activity accompanying \*\* and can

control a controlled system or the candidate for actuation.

[0010] The 2nd technical problem of this invention is to offer the optical topography equipment which can display the condition of change of the \*\*\*\* activity accompanying praying.

[0011] The 3rd technical problem of this invention is to offer the database which stored the data generated by the data generation equipment and data generation equipment which can generate the data about change of the brain activity accompanying praying.

[0012] The 4th technical problem of this invention is to offer the usage of a database that the data about change of the brain activity accompanying praying were stored.

[0013]

[Means for Solving the Problem] The optical POTOGURAFI equipment which comes to have a condensing means condense the reflected light of the light which penetrated the blood in said head among the light irradiated by said head from the Mitsuteru gunner stage which irradiates light on a head including a brain in order to solve said 1st technical problem, and said Mitsuteru gunner stage, and the control means which controls a controlled system based on the luminous intensity condensed by said condensing means constitutes.

[0014] In order to solve said 2nd technical problem, moreover, this invention A condensing means to condense the reflected light of the light which penetrated the blood in said head among the light irradiated by said head from the Mitsuteru gunner stage which irradiates light on a head including a brain, and said Mitsuteru gunner stage, The optical POTOGURAFI equipment which comes to have a photo-electric-conversion means to change into the electrical signal according to the reinforcement the light condensed by said condensing means, and a display means to display the image according to the level of the electrical signal by the output of said photo-electric-conversion means on a screen is constituted.

[0015] It faces constituting said optical topography equipment, and the following elements can be added instead of said display means.

[0016] (1) It comes to have an actuation signal output means to compare the level and the set point of an electrical signal by the output of said photo-electric-conversion means, and to output the actuation signal according to this comparison result, and a display means to display the image according to said actuation signal on a screen.

[0017] (2) It comes to have an actuation signal output means compares the level and the set point of an electrical signal by the output of said photo-electric-conversion means, and output the actuation signal according to this comparison result, a display means display the image containing the candidate for actuation on a screen, and the image control means that answers said actuation signal and controls migration for [ on said screen ] actuation.

[0018] (3) It comes to have an actuation signal output means compares the level and the set point of an electrical signal by the output of said photo-electric-conversion means, and output the actuation signal according to this comparison result, a display means display the image containing a character on a screen, and the image control means that answers said actuation signal and controls migration of the character on said screen.

[0019] It faces constituting said each optical topography equipment, and near infrared ray light can be used as a light.

[0020] The Mitsuteru gunner stage which irradiates light on the head on which this invention includes a brain in order to solve the 3rd technical problem, A condensing means to condense the reflected light of the light which penetrated the blood in said head among the light irradiated by said head, A photo-electric-conversion means to change into the electrical signal according to the reinforcement the light condensed by said condensing means, The data generation equipment which comes to have a data generation means to relate with a time-axis the data in which change of said blood is shown based on the electrical signal acquired by said photo-electric-conversion means, and to generate them is constituted.

[0021] It faces constituting said data generation means, and the following elements can be added.

[0022] (1) Change of said blood is change of the amount of blood, or the hemoglobin concentration in blood.

[0023] (2) It comes to have a stimulus means to relate with two or more parameters which

receive the data which should be generated, and to give a stimulus to said brain.

[0024] (3) Said light is near infrared ray light.

[0025] Moreover, the database which comes to store the data generated by said one of data generation equipments can be constituted.

[0026] In order to solve the 4th technical problem, this invention is faced using the database which comes to store the data generated by said one of data generation equipments through a network, and the usage of the database characterized by opening said database only to access containing the registration number set up beforehand is adopted.

[0027] When according to the above mentioned means light is irradiated by the head including a brain, the reflected light of the light which penetrated the blood in a head is condensed and the condensed luminous intensity is detected, this luminous intensity Since the amount or hemoglobin concentration of blood in an experience person's head changes, this change appears as change of the permeability of light and change of the permeability of this light is reflected in luminous intensity when an experience person (operator) prays, based on luminous intensity, a controlled system is controllable. That is, an experience person (operator) can control a controlled system by praying without using a hand and a guide peg according to the degree to pray.

[0028] Moreover, when luminous intensity is changed into an electrical signal and the image based on this electrical signal is displayed, migration of GYARAKUTA for actuation can be controlled for the image according to how to pray an experience person (operator) by display \*\*\*\* and how to pray.

[0029] Moreover, when comparing the level and the set point of an electrical signal according to luminous intensity and displaying the image by the actuation signal according to this comparison result on a screen, it can use for an experience person's degree of comprehension, a diagnosis, etc. by seeing the image on this screen.

[0030]

[Embodiment of the Invention] Hereafter, 1 operation gestalt of this invention is explained based on a drawing. Drawing 1 is 1 operation gestalt of this invention, and is the block block diagram of the optical topography equipment containing data generation equipment. In drawing 1, optical topography equipment is equipped with the controller 10 which consisted of personal computers, and the controller 10 is connected to the fastener 18 through the A/D (analog-to-digital) converter 20, the optical/electrical converter 22, and the optical fiber 24 while connecting with the fastener 18 through a switch (control line) 12, the light source 14, and an optical fiber 16. When a switch 12 opens and closes a circuit according to the command from a controller 10 and a circuit closes, power is supplied to the light source 14. This light source 14 consists of semiconductor laser which has for example, oscillation wavelength in a near infrared ray field, and the near infrared ray light generated from the light source 14 is transmitted to a fastener 18 through an optical fiber 16.

[0031] A fastener 18 is constituted by band-like and an experience person's head 26 is equipped with it. And the edge of an optical fiber 16 is connected to the end of a fastener 18, and the edge of an optical fiber 24 is connected to the other end of a fastener 18. If the near infrared ray light from the light source 14 is irradiated by the head 26 through an optical fiber 16 where a head 26 is equipped with a fastener 18, a part of light which the near infrared ray light irradiated by the head 26 penetrated the blood in the metencephalon which penetrated the skull of a head 26, and penetrated blood will be scattered about, and the part will be condensed by the optical fiber 24 as the reflected light. That is, the light source 14 and an optical fiber 16 are constituted as a Mitsuteru gunner stage, and the optical fiber 24 is constituted as a condensing means.

[0032] The light condensed with the optical fiber 24 is led to an optical/electrical converter 22, and is changed into the electrical signal of the analog quantity from which level (amplitude) changes with optical/electrical converters 22 according to the reinforcement. This optical/electrical converter 22 consists of for example, avalanche EFOTO diodes, and the electrical signal acquired by the optical/electrical converter 22 as a photo-electric-conversion means is outputted to A/D converter 20. A/D converter 20 changes into a digital signal the analog signal which is an electrical signal from an optical/electrical converter 22, and transmits

this digital signal to a controller 10 one by one.

[0033] When the light condensed with the optical fiber 24 is changed into the electrical signal according to that reinforcement and inputted as a digital signal, a controller 10 generates the picture signal for displaying the image according to the level of an electrical signal, outputs this picture signal to the display 28 as a display means, and displays the image according to a picture signal on the screen of a display 28.

[0034] Moreover, a controller 10 is equipped with the function as a control means, generates the control signal according to an electrical signal, and controls the drive of a device 30 according to this control signal.

[0035] Furthermore, while a controller 10 is equipped with the function as an actuation signal output means, comparing the level and the set point of the inputted electrical signal and outputting the actuation signal according to this comparison result It has a function as an image control means, the picture signal which answered the actuation signal and followed the actuation signal is generated, and migration of the character for actuation displayed on the screen of a display 28 is controlled.

[0036] Moreover, a controller 10 relates the data in which are equipped with the function as a data generation means, and change of blood is shown based on the inputted electrical signal (digital signal) with a time-axis, generates and stores the generated data in a database 32.

[0037] It is supposed that it faces generating data, change of an activity an experience person's brain is caught, and data are collected. That is, if an experience person prays while irradiating near infrared ray light at the experience person, change will arise into the blood contained in an experience person's brain.

[0038] Specifically according to how to pray an experience person, the amount of the blood in a brain or the hemoglobin concentration in blood (reduction, concentration of an oxyhemoglobin) changes. If the amount of blood or the hemoglobin concentration in blood changes, the transmission of the near infrared ray light irradiated by an experience person's head 26 will change, and this change will be reflected in the luminous intensity condensed with an optical fiber 24. For this reason, the data in which an experience person prays and the degree of the direction is shown by storing the data according to the electrical signal according to the condensed luminous intensity are collectable.

[0039] While facing collecting data and irradiating near infrared ray light on an experience person's head 26 The question matter for relating with two or more parameters which receive the data which should be generated, and giving a stimulus to an experience person's brain, For example, the individual humanity news to various parameters which prays and shows the degree of the direction is collectable with outputting the question matter about an experience person's condition etc. with voice from the loudspeaker (stimulus means) connected to the controller 10.

[0040] By storing in a database 32 the data obtained as this individual humanity news, as a rehabilitation educational tool, the data stored in the database 32 can be used for independence rehabilitation training education, such as poliomyelitis, or can also be used for the correspondence at the time of epilepsy generating as an urgent evasion tool of an automobile.

[0041] Next, the operation when using optical topography equipment for a game is explained according to drawing 2 and drawing 3 . First, if the program (game software) and image information about a game are inputted into a controller 10, the image according to this image information will be displayed on the screen of a display 28. If an operator's (game user) head 26 is equipped with a fastener 18 at this time, the near infrared ray light from the light source 14 will be irradiated by the head 26.

[0042] Actuation of an operator initiation of a game displays a character 34 on the screen of a display 28 with advance of game software (step S1). Then, the migration direction of a character 34 is shown by the arrow head on the screen of a display 28 (step S2). If it prays that an operator passes the hole 36 which serves as a target in a character 34 at this time, the luminous intensity according to how to pray will be detected by the optical/electrical converter 22 through an optical fiber 24 (step S3). If the light detected with the optical/electrical converter 22 is changed into an electrical signal, this electrical signal will be changed into a digital signal through A/D converter 20, and will be outputted to a controller 10. The operation for a controller 10

evaluating the value of the inputted digital signal (step S4), and matching the evaluated data with an experience person and amending them is performed (step S5).

[0043] Then, a controller 10 generates the actuation signal according to the amended value, and moves a character 34 according to an actuation signal (step S6). At this time, a character 34 moves based on the electrical signal which the operator prayed and was generated according to the degree of the direction, and when the level of the inputted electrical signal exceeds the set point, a character 34 will pass the hole 36 used as a target.

[0044] On the other hand, when the level of the inputted electrical signal is below the set point, or when it separates from the range of the set point, without passing a hole 36, a character 34 is prayed and moves to the location according to the degree of the direction.

[0045] And when judged with return and a character 34 not passing a hole 36 to step S2 when a character 34 passes a hole 36, the migration result of a detection value and a character 34 detected by (step S7) and step S4 is compared (step S8). Then, the operation for changing the correction value used at step S5 according to a comparison result is performed (step S9), new correction value is calculated from this result of an operation (step S10), and it returns to step S2.

[0046] When correction value is only updated once and a character 34 does not arrive at a target location, next processing does not update correction value, but can repeat the same game only by displaying the migration result of a character 34, or can also be made to shift to other games, although renewal of sequential of the correction value is carried out whenever processing to step S2 – step S10 is repeated and it moves to steps S8–S10.

[0047] Thus, a character 34 can be moved using the activity of an operator's brain itself, without according to this operation gestalt, being able to move a character 34 and using a hand and a guide peg depending on how praying an operator.

[0048] Moreover, before it faces performing a game and a game starts, in order to use as data of an affinity diagnosis of an operator individual's database, the data in which an operator individual prays and the degree of the direction is shown can be collected, and the collected data can also be built into a game. In this case, it becomes possible to perform the game doubled with an operator individual's skill and inclination.

[0049] For example, according to individual skill, the scene (scene) of games, such as the contents of the game, easy nature, and difficulty, is changeable.

[0050] Moreover, when an operator prays and it carries out image display of the degree of the direction, according to this way of praying, the color of a character 34 can also be changed in red, green, and blue.

[0051] In said operation gestalt, although what used optical topography equipment for the game was described, this equipment is applicable to education etc. For example, each student can be made to be able to carry a fastener 18, each student can pray whether he understands what the teacher said, and it can judge according to the stage of the direction.

[0052] It faces using the database 32 collected as individual humanity news, and when making the data in a database 32 use for what connected the database 32 to the network (Internet) and was connected to the network, the approach of opening a database 32 only to access containing the registration number set up beforehand can be adopted, for example. In this case, a registration number can also consist of codes.

[0053]

[Effect of the Invention] As explained above, according to this invention, an experience person (operator) can control a controlled system by praying without using a hand and a guide peg according to the degree to pray.

[0054] Moreover, according to this invention, migration of GYARAKUTA for actuation is [ the image according to how to pray an experience person (operator) ] controllable by display \*\*\*\* and how to pray.

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[Translation done.]



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## **MEANS**

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[Means for Solving the Problem] The optical POTOGURAFI equipment which comes to have a condensing means condense the reflected light of the light which penetrated the blood in said head among the light irradiated by said head from the Mitsuteru gunner stage which irradiates light on a head including a brain in order to solve said 1st technical problem, and said Mitsuteru gunner stage, and the control means which controls a controlled system based on the luminous intensity condensed by said condensing means constitutes.

[0014] In order to solve said 2nd technical problem, moreover, this invention A condensing means to condense the reflected light of the light which penetrated the blood in said head among the light irradiated by said head from the Mitsuteru gunner stage which irradiates light on a head including a brain, and said Mitsuteru gunner stage, The optical POTOGURAFI equipment which comes to have a photo-electric-conversion means to change into the electrical signal according to the reinforcement the light condensed by said condensing means, and a display means to display the image according to the level of the electrical signal by the output of said photo-electric-conversion means on a screen is constituted.

[0015] It faces constituting said optical topography equipment, and the following elements can be added instead of said display means.

[0016] (1) It comes to have an actuation signal output means to compare the level and the set point of an electrical signal by the output of said photo-electric-conversion means, and to output the actuation signal according to this comparison result, and a display means to display the image according to said actuation signal on a screen.

[0017] (2) It comes to have an actuation signal output means compares the level and the set point of an electrical signal by the output of said photo-electric-conversion means, and output the actuation signal according to this comparison result, a display means display the image containing the candidate for actuation on a screen, and the image control means that answers said actuation signal and controls migration for [ on said screen ] actuation.

[0018] (3) It comes to have an actuation signal output means compares the level and the set point of an electrical signal by the output of said photo-electric-conversion means, and output the actuation signal according to this comparison result, a display means display the image containing a character on a screen, and the image control means that answers said actuation signal and controls migration of the character on said screen.

[0019] It faces constituting said each optical topography equipment, and near infrared ray light can be used as a light.

[0020] The Mitsuteru gunner stage which irradiates light on the head on which this invention includes a brain in order to solve the 3rd technical problem, A condensing means to condense the reflected light of the light which penetrated the blood in said head among the light irradiated by said head, A photo-electric-conversion means to change into the electrical signal according to the reinforcement the light condensed by said condensing means, The data generation equipment which comes to have a data generation means to relate with a time-axis the data in which change of said blood is shown based on the electrical signal acquired by said photo-electric-conversion means, and to generate them is constituted.

[0021] It faces constituting said data generation means, and the following elements can be

added.

[0022] (1) Change of said blood is change of the amount of blood, or the hemoglobin concentration in blood.

[0023] (2) It comes to have a stimulus means to relate with two or more parameters which receive the data which should be generated, and to give a stimulus to said brain.

[0024] (3) Said light is near infrared ray light.

[0025] Moreover, the database which comes to store the data generated by said one of data generation equipments can be constituted.

[0026] In order to solve the 4th technical problem, this invention is faced using the database which comes to store the data generated by said one of data generation equipments through a network, and the usage of the database characterized by opening said database only to access containing the registration number set up beforehand is adopted.

[0027] When according to the above mentioned means light is irradiated by the head including a brain, the reflected light of the light which penetrated the blood in a head is condensed and the condensed luminous intensity is detected, this luminous intensity Since the amount or hemoglobin concentration of blood in an experience person's head changes, this change appears as change of the permeability of light and change of the permeability of this light is reflected in luminous intensity when an experience person (operator) prays, based on luminous intensity, a controlled system is controllable. That is, an experience person (operator) can control a controlled system by praying without using a hand and a guide peg according to the degree to pray.

[0028] Moreover, when luminous intensity is changed into an electrical signal and the image based on this electrical signal is displayed, migration of GYARAKUTA for actuation can be controlled for the image according to how to pray an experience person (operator) by display \*\*\*\*\* and how to pray.

[0029] Moreover, when comparing the level and the set point of an electrical signal according to luminous intensity and displaying the image by the actuation signal according to this comparison result on a screen, it can use for an experience person's degree of comprehension, a diagnosis, etc. by seeing the image on this screen.

[0030]

[Embodiment of the Invention] Hereafter, 1 operation gestalt of this invention is explained based on a drawing. Drawing 1 is 1 operation gestalt of this invention, and is the block block diagram of the optical topography equipment containing data generation equipment. In drawing 1, optical topography equipment is equipped with the controller 10 which consisted of personal computers, and the controller 10 is connected to the fastener 18 through the A/D (analog-to-digital) converter 20, the optical/electrical converter 22, and the optical fiber 24 while connecting with the fastener 18 through a switch (control line) 12, the light source 14, and an optical fiber 16. When a switch 12 opens and closes a circuit according to the command from a controller 10 and a circuit closes, power is supplied to the light source 14. This light source 14 consists of semiconductor laser which has for example, oscillation wavelength in a near infrared ray field, and the near infrared ray light generated from the light source 14 is transmitted to a fastener 18 through an optical fiber 16.

[0031] A fastener 18 is constituted by band-like and an experience person's head 26 is equipped with it. And the edge of an optical fiber 16 is connected to the end of a fastener 18, and the edge of an optical fiber 24 is connected to the other end of a fastener 18. If the near infrared ray light from the light source 14 is irradiated by the head 26 through an optical fiber 16 where a head 26 is equipped with a fastener 18, a part of light which the near infrared ray light irradiated by the head 26 penetrated the blood in the metencephalon which penetrated the skull of a head 26, and penetrated blood will be scattered about, and the part will be condensed by the optical fiber 24 as the reflected light. That is, the light source 14 and an optical fiber 16 are constituted as a Mitsuteru gunner stage, and the optical fiber 24 is constituted as a condensing means.

[0032] The light condensed with the optical fiber 24 is led to an optical/electrical converter 22, and is changed into the electrical signal of the analog quantity from which level (amplitude) changes with optical/electrical converters 22 according to the reinforcement. This

optical/electrical converter 22 consists of for example, avalanche EFOTO diodes, and the electrical signal acquired by the optical/electrical converter 22 as a photo-electric-conversion means is outputted to A/D converter 20. A/D converter 20 changes into a digital signal the analog signal which is an electrical signal from an optical/electrical converter 22, and transmits this digital signal to a controller 10 one by one.

[0033] When the light condensed with the optical fiber 24 is changed into the electrical signal according to that reinforcement and inputted as a digital signal, a controller 10 generates the picture signal for displaying the image according to the level of an electrical signal, outputs this picture signal to the display 28 as a display means, and displays the image according to a picture signal on the screen of a display 28.

[0034] Moreover, a controller 10 is equipped with the function as a control means, generates the control signal according to an electrical signal, and controls the drive of a device 30 according to this control signal.

[0035] Furthermore, while a controller 10 is equipped with the function as an actuation signal output means, comparing the level and the set point of the inputted electrical signal and outputting the actuation signal according to this comparison result It has a function as an image control means, the picture signal which answered the actuation signal and followed the actuation signal is generated, and migration of the character for actuation displayed on the screen of a display 28 is controlled.

[0036] Moreover, a controller 10 relates the data in which are equipped with the function as a data generation means, and change of blood is shown based on the inputted electrical signal (digital signal) with a time-axis, generates and stores the generated data in a database 32.

[0037] It is supposed that it faces generating data, change of an activity an experience person's brain is caught, and data are collected. That is, if an experience person prays while irradiating near infrared ray light at the experience person, change will arise into the blood contained in an experience person's brain.

[0038] Specifically according to how to pray an experience person, the amount of the blood in a brain or the hemoglobin concentration in blood (reduction, concentration of an oxyhemoglobin) changes. If the amount of blood or the hemoglobin concentration in blood changes, the transmission of the near infrared ray light irradiated by an experience person's head 26 will change, and this change will be reflected in the luminous intensity condensed with an optical fiber 24. For this reason, the data in which an experience person prays and the degree of the direction is shown by storing the data according to the electrical signal according to the condensed luminous intensity are collectable.

[0039] The loudspeaker by which the question matter about the question matter for relating with two or more parameters which receive the data which should be generated, and giving a stimulus to an experience person's brain while facing collecting data and irradiating near infrared ray light on an experience person's head 26, for example, an experience person's condition etc., was connected to the controller 10

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[Translation done.]

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**TECHNICAL FIELD**

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[Field of the Invention] This invention relates to optical topography equipment and data generation equipment, detects the signal which reflected the activity of a cerebral function especially using light or near infrared ray light, and relates to suitable optical topography equipment to control a controlled system, the candidate for actuation, etc. using this detecting signal, and data generation equipment.

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**PRIOR ART**

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[Description of the Prior Art] It faces operating game equipment, a computer, etc. conventionally, and the joy stick, a handle, a keyboard, etc. are used, and these actuation means answer actuation of an operator and generate a signal.

[0003] On the other hand, there is a thing indicated by JP,6-296757,A and JP,7-124331,A to operate game equipment using an electroencephalogram, without requiring actuation of an operator. When an electroencephalogram is used, actuation of an operator becomes unnecessary, but when using an electroencephalogram, an electroencephalogram must be changed into an electrical signal, and since this electrical signal is detected as a feeble electrical signal, moreover, it tends to be influenced of the electric noise produced when muscles are moved, or an outpatient department nozzle.

[0004] As that with which this fault is compensated, a cerebral activity is measured by optical technique and what uses this measured value for the input to various equipments is proposed as indicated by JP,9-149894,A.

[0005] However, when using a cerebral function signal for a data input or a control signal, it is difficult to check immediately whether the input data and the control signal itself are the contents which the operator meant. Since various electrical signals overlap, especially an electroencephalogram must perform signal processing of removing an unnecessary signal from the measured signal. Therefore, it is difficult to check immediately what an operator's current cerebral function signal has become, and when mistaken data are inputted, it is difficult [ it ] to correct immediately.

[0006] Then, using near infrared ray light, the cerebral function signal accompanying actuation of an operator's hand is detected, and what controlled the device according to the detected cerebral function signal is proposed (JP,2000-172407,A).

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] As explained above, according to this invention, an experience person (operator) can control a controlled system by praying without using a hand and a guide peg according to the degree to pray.

[0054] Moreover, according to this invention, migration of GYARAKUTA for actuation is [ the image according to how to pray an experience person (operator) ] controllable by display \*\*\* and how to pray.

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[Translation done.]

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] In the conventional technique, the cerebral function signal accompanying actuation of an operator's hand is detected using near infrared ray light, and since the device is controlled according to the detected cerebral function signal, according to the actuation condition of a hand, a device is controllable.

[0008] However, controlling a device is not considered about detecting change of a cerebral activity and controlling a device etc., either, without an operator's having to operate a hand, and detecting the brain activity itself, namely, operating a hand, a guide peg, etc.

[0009] When the 1st technical problem of this invention is prayed, it is to offer the optical topography equipment which can catch change of the brain activity accompanying \*\* and can control a controlled system or the candidate for actuation.

[0010] The 2nd technical problem of this invention is to offer the optical topography equipment which can display the condition of change of the \*\*\*\* activity accompanying praying.

[0011] The 3rd technical problem of this invention is to offer the database which stored the data generated by the data generation equipment and data generation equipment which can generate the data about change of the brain activity accompanying praying.

[0012] The 4th technical problem of this invention is to offer the usage of a database that the data about change of the brain activity accompanying praying were stored.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] It is the block block diagram of the optical topography equipment in which 1 operation gestalt of this invention is shown.

[Drawing 2] It is drawing for explaining the operating instructions when using optical topography equipment for a game.

[Drawing 3] It is a flow chart for explaining the operation when using optical topography equipment for a game.

[Description of Notations]

- 10 Controller
- 12 Switch
- 14 Light Source
- 16 Optical Fiber
- 18 Fastener
- 20 A/D Converter
- 22 Optical/electrical Converter
- 24 Optical Fiber
- 26 Head
- 28 Display
- 30 Device
- 32 Data \*\* - SU
- 34 Character
- 36 Hole

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[Translation done.]



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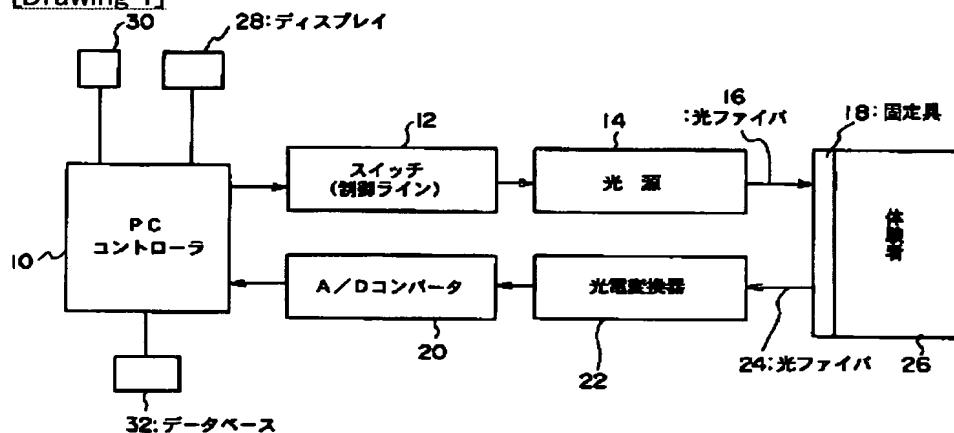
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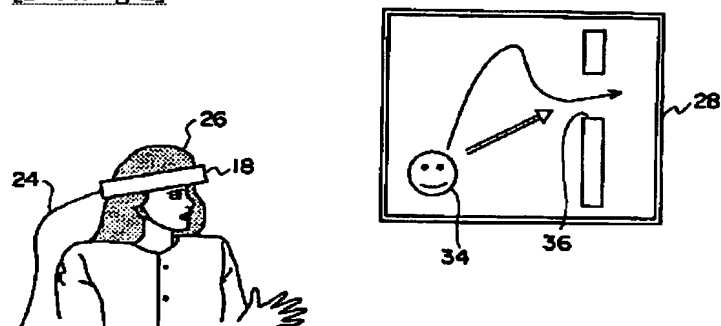
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DRAWINGS

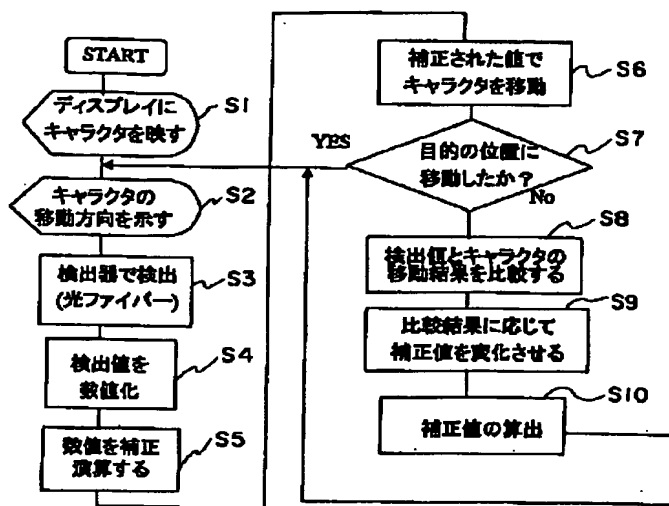
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]